Flip chip components

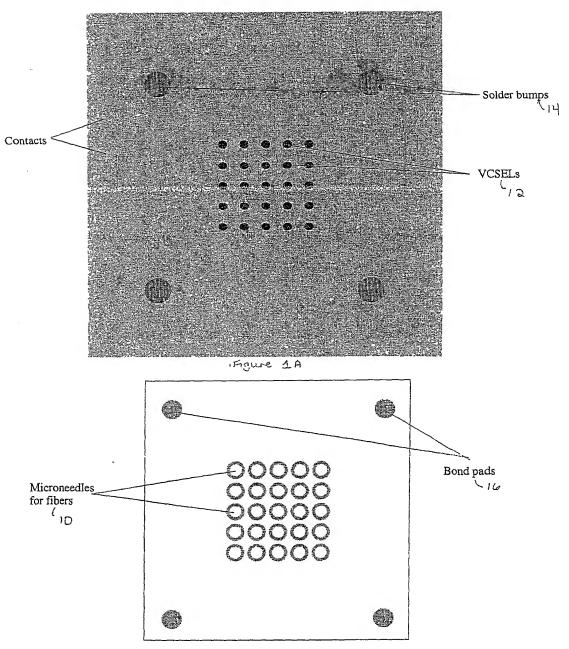


Figure 10

Flip Chip Assembly Drawing

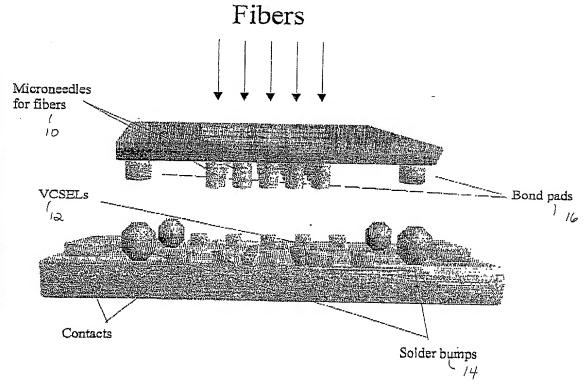


Figure 26

Metal Microneedle Fabrication Process

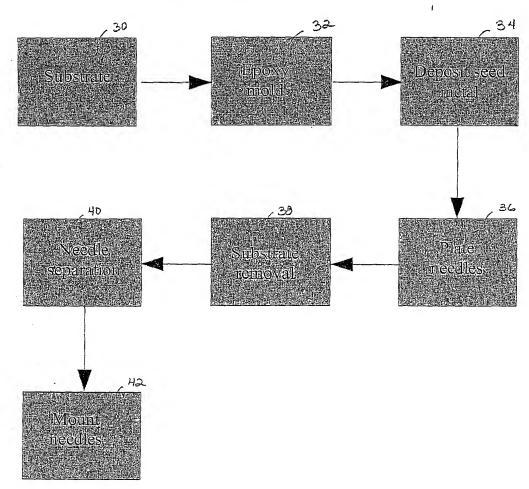


Figure 3A

The street great street with the street of the street of the street stre

Fiber/VCSEL Assembly Process

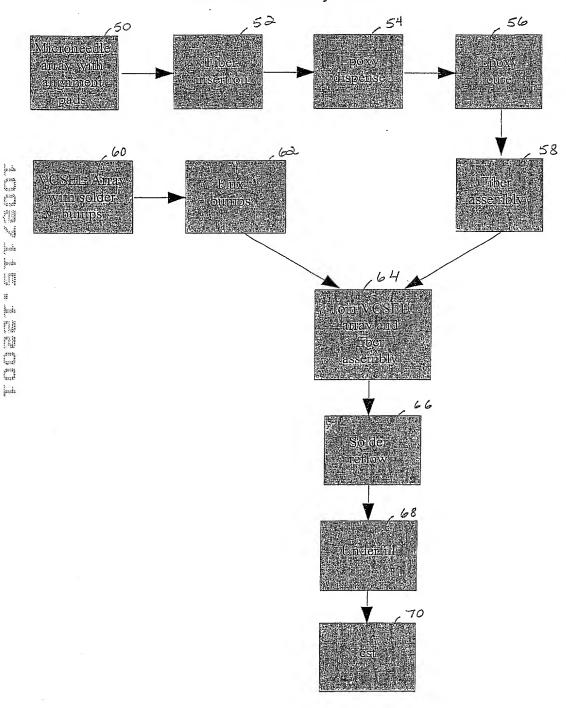
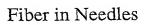
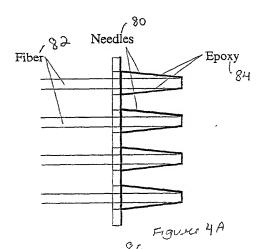


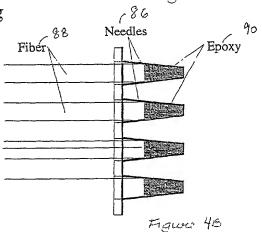
Figure 38

Fiber Assembly Cross-Sections





Fiber w/ Epoxy Plug



Fiber w/ epoxy lens

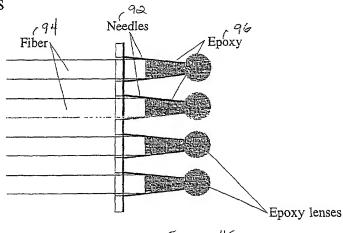
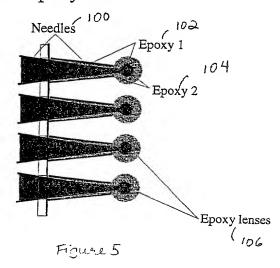


Figure 4C

Fiber w/ graded epoxy lens



Micro-extrusion

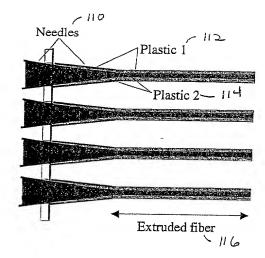


Figure 6

Underfill 130

Connector-Fiber to Laser

Before insertion Needle array 2 Fiber Needle array 1 Epoxy Laser array 128

Fiber assembly

Laser/PD assembly

Figure 71

After insertion

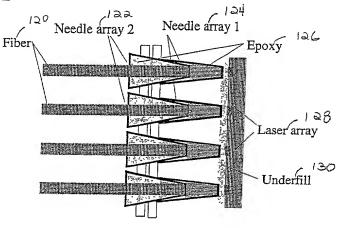
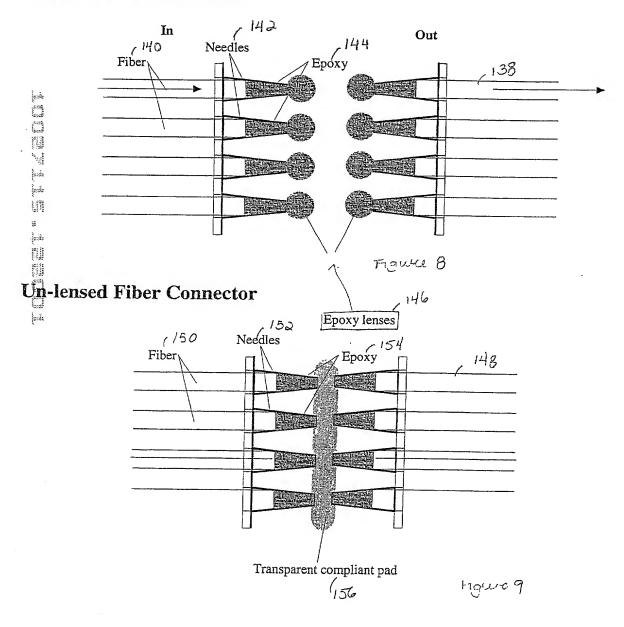
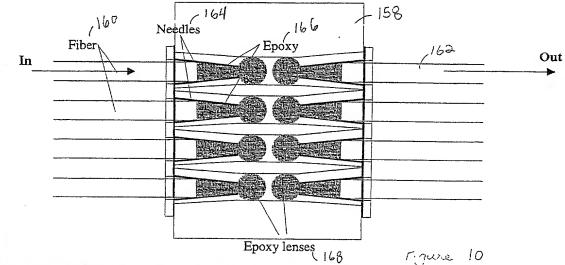


Figure 76

Lensed Fiber Connector



Lensed Fiber Connector w/ Alignment Spacer



Un-lensed Fiber Connector w/ Alignment Spacer

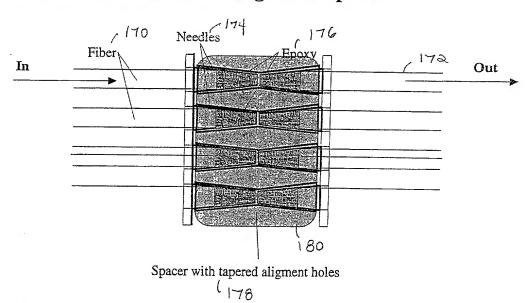


Figure 11

Fiber w/ Sensor Plug

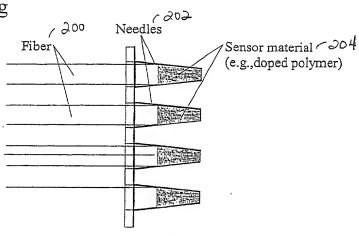
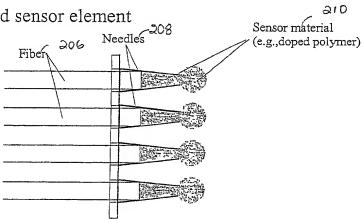


Figure 12 A

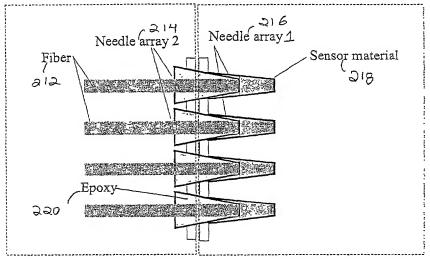
Fiber w/ lens-shaped sensor element



FigurelaB

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Matter No.: 11019-029001 Applicant(s): Donald E. Ackley MICRONEEDLE ARRAY SYSTEMS



Fiber-optic excitation through matching needle array

Detachable sensor element

Figure 12C